MOXA TCC-120/120I

User's Guide

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MOXA TCC-120/120I

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1. Overview

Introduction

Many important devices used in today's industrial environment use the RS-422 or RS-485 interface for data transmission. In some cases however, it is necessary to extend the transmission distance between RS-422/485 devices. This is where TCC-120/120I RS-422/485 Repeater comes in. Simply wire the power block, wire the two signal blocks, set the DIP switches, and you're ready to go.

The RS-422/485 standards use a differential signal for transmitting data and control signals. In addition to distance and multi-drop issues for industrial applications, housing, wiring, power supply, and over-surge protection are also serious concerns.

TCC-120I also provides isolation protection for users who need an industrial grade repeater to extend RS-422/485 transmission distance and increase networking capability. The superior industrial application design of this product, which includes DIN-Rail mounting, terminal block wiring, external terminal block power, and optical isolation for system protection, makes TCC-120/120I suitable for use in critical industrial environments.

Built-in RS-485 ADDC™ Intelligence

ADDC™ (Automatic Data Direction Control), a *MOXA leading technology*, uses a clever hardware solution to take care of RS-485's data flow control problem. ADDC™ is a hardware data flow solution that automatically senses and controls data direction, making the handshaking signal method obsolete.

Isolation

MOXA's electrical isolation technology uses two photo couplers to create a gap in each electrical signal. One photo coupler transforms the electrical signal into a light signal, which is transmitted across a small gap, and then the other photo coupler transforms the light back into an electrical signal. In this way, the two electrical circuits are completely isolated from each other, limiting the damage that could otherwise be caused by power surges in the electrical signal.

Reverse Power Protection

The Reverse Power Protection feature provides extra protection against accidentally connecting the power cables to the wrong terminal. The converter is designed to automatically detect which power wire is positive and which is negative, and then adjust the power supply accordingly.

DIP Switch Selectable Terminator

For many products of this type, the termination resistor is set by a jumper located inside the product's casing, so that the user must open the casing to disable or change the resistor's strength. MOXA offers a better solution. TCC-120/120I's terminator is set with a DIP Switch located on the outside of the converter's casing.

Auto Baud Rate Detection

TCC-120/120I incorporates a method for automatically detecting the serial signal's baud rate by hardware. This is an extremely convenient feature for the user. Even if a device's baud rate changes, the signal will still be transmitted through the RS-422/488 repeater without any problem.

2. Features

- Boost serial signal for extending transmission distance up to an additional 1.2 km
- Wall or DIN-Rail mountable
- Terminal block for easy wiring
- Power input from terminal block
- DIP Switch enabled built-in terminator (120 ohms)
- PWR, Tx, Rx LEDs
- Embedded Surge Protection (16 KV ESD)
- Operating temperature from -20˚C to 60˚C
- 2 KV Isolation (for TCC-120I)

3. Package Checklist

Before installing MOXA TCC-100/100I, verify that the package contains the following items:

Standard Accessories

- TCC-120 or TCC-120I
- User's Manual (this document)
- Warranty Booklet
- 5-contact terminal block connectors x 2
- 3-contact terminal block connector x 1

Optional Accessory

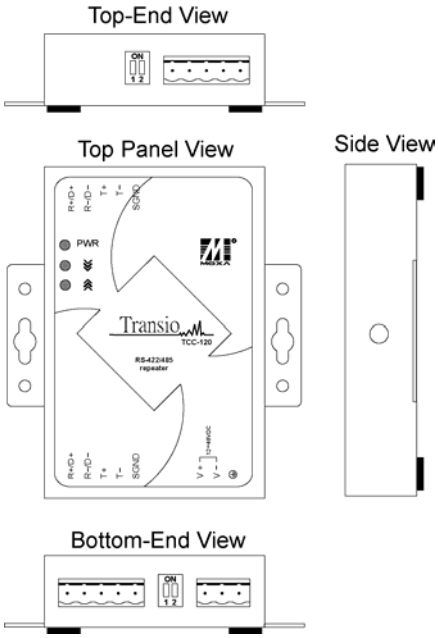
- 2 DIN-Rail mounting brackets w/ 4 screws

Please notify your sales representative if any of the above items is missing or damaged.

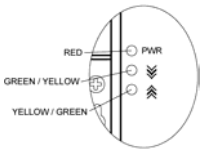
4. Specifications

Model Names	**TCC-120, TCC-120I**	
Communication		
Signals for 2-wire (RS-485 2-wire)	Data+, Data-, SGND	
Signals for 4-wire (RS-422 or 4-wire RS-485)	Tx+, Tx-, Rx+, Rx-, SGND	
RS-485 Data Direction Control	ADDC™	
Baud Rate	50 bps – 230.4 Kbps	
Surge Protection	16 KV ESD RMS, for all signals	
Isolation	2 KV for both Power and Signal (TCC-100I)	
Environment		
Operating Temperature	-20˚C to 60˚C	
Storage Temperature	-20˚C to 85˚C	
Humidity	5 to 95 %RH	
Power		
Input Power Voltage	External Power 12-30 VDC, Terminal Block	
Reverse Power Protection	Protects against V+/V- reversal	
Over Current Protection	Protects against 2 signals shorted together	
Power Consumption	TCC-120: 3.4 W = 12V × 286 mA = 24V × 143 mA = 30V × 113 mA	TCC-120I: 4.68 W = 12V × 390 mA = 24V × 195 mA = 30V × 156 mA
Mechanical		
Dimensions (W×D×H)	67×100×22 mm (casing only)	
	90×100×22 mm (including ears)	
Casing material	Aluminum	
Plug-In Screw Terminal Block	#22 – #16 AWG	
Color	Black	
Weight	148±5 g	
Regulatory Approvals	CE, FCC (Class B)	

5. Product Views



6. LED Indicators



TCC-100/100I's top panel contains three LED indicators, as described in the following table:

LED Name	LED Function	
PWR	Red indicates the power is on.	
⩔	Green	Data is entering through the top-end port and exiting through the bottom-end port.
	Yellow	Data is entering through the bottom-end port and exiting through the top-end port.
⩓	Green	Data is entering through the bottom-end port and exiting through the top-end port.
	Yellow	Data is entering through the top-end port and exiting through the bottom-end port.

7. Installation

Installing TCC-120/120I involves four straightforward steps:

- **STEP 1**: Set the terminator DIP Switches
- **STEP 2**: Attach the Power Supply
- **STEP 3**: Wire the RS-422/485 Terminal Blocks
- **STEP 4**: Test the Connection

The details of each of these four steps are described next.

STEP 1: Set the DIP Switches

The DIP Switches on TCC-120/120I are used to set the signal transmission mode and to enable or disable the termination resistor. You can configure for either 2-wire (RS-485) or 4-wire (RS-422/485) transmission mode. Also note that your program and serial port should be set to match the repeater's settings.

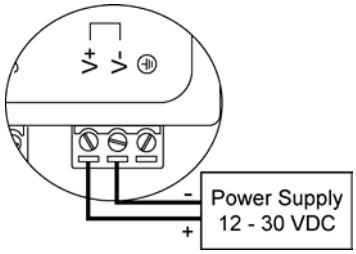
NOTE TCC-120/120I has two sets of DIP Switches—one set on the top-end and the other set on the bottom-end. To ensure proper data transmission, **make sure that the two sets of DIP switches are configured the same**.

SW1—Switch 1 selects 4-wire or 2-wire mode. Set Switch 1 to the ON position for 4-wire, and to the OFF position for 2-wire.

SW2—Switch 2 enables or disables termination. Set Switch 2 to the ON position to enable termination, and to the OFF position to disable termination.

→ For easy reference, the following figures depict the four possible settings.

STEP 2: Attach the Power Supply



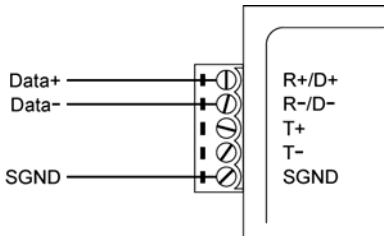
TCC-120/120I is powered by an external 12-30 VDC power supply. To connect to the power supply, run two wires from the V+ and V- terminals, on TCC-120's 3-connector terminal block, to the DC power supply, as shown in the figure to the left.

Once the power supply is connected to its power source, the PWR LED located on TCC-120's top panel should be illuminated in red.

NOTE TCC-120/120I provides reverse power protection. I.e., it will automatically detect which power wire is negative, and which is positive.

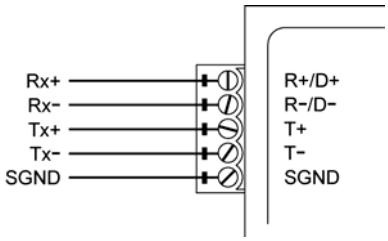
STEP 3: Wire the Terminal Block

There are two wiring options available for connecting to TCC-120/120I's RS-422/485 terminal block.



2-wire

When using the 2-wire (for RS-485) wiring option, you will need to connect three wires from each of TCC-100/100I's RS-422/485 terminal blocks to the opposite connections. Connect from R+/D+ to Data+, from R-/D- to Data-, and from SGND to SGND.



4-wire

When using the 4-wire (for RS-422 or 4-wire RS-485) wiring option, you will need to connect five wires from each of TCC-100/100I's RS-422/485 terminal blocks to the opposite connections. Connect from R+/D+ to Rx+, from R-/D- to Rx-, from T+ to Tx+, from T- to Tx-, and from SGND to SGND.

STEP 4: Test the Connection

After setting the DIP Switches, connecting the power, and wiring the terminal block, we suggest using a Console Terminal program, such as HyperTerminal or Moxa Terminal Emulator, to test the connection. If you have an RS-422/485 serial board (such as MOXA Industio CP-132) installed in your PC, you can connect your PC's COM port to one of TCC-100/100I's RS-422/485 terminal blocks, and connect TCC-100/100I's other RS-422/485 terminal block to one of the RS-422/485 serial board's ports. Next, start HyperTerminal or Moxa Terminal Emulator, and then open a connection to the COM port, and to the port associated with TCC-100/100I's RS-422/485 port. Simply type a few characters on your PC's keyboard. The characters you type should show up in the HyperTerminal window that is currently inactive, indicating that the typed characters were transmitted between TCC-100/100I's two RS-422/485 ports.

8. Service Information

Customer satisfaction is our number one concern. To ensure that customers receive the full benefit of our products, Moxa Internet Services has been set up to provide technical support, product information, and user's manual updates.

- E-mail for technical support:
  support@moxa.com.tw

- World Wide Web (www) site for product information:
  http://www.moxa.com
  http://www.moxa.com.tw

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